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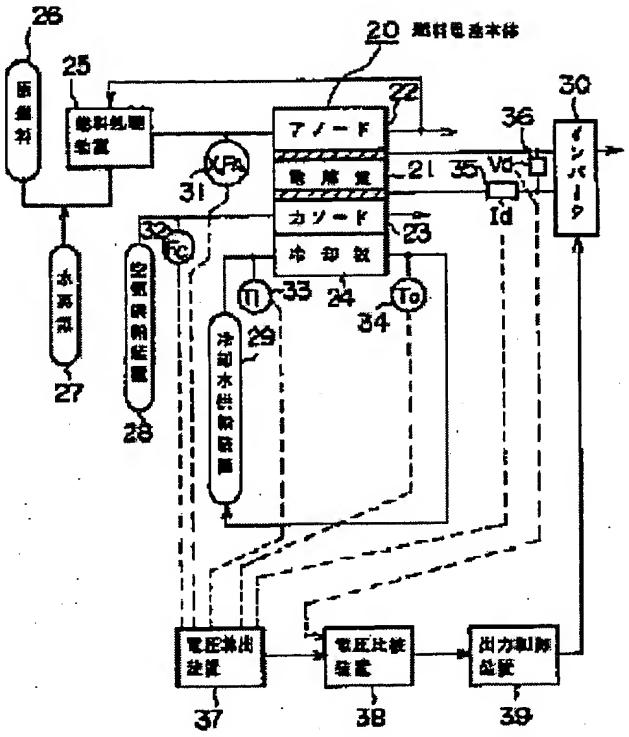
FUEL CELL POWER GENERATING DEVICE AND OPERATION METHOD

Patent number: JP9055219
Publication date: 1997-02-25
Inventor: TANIGUCHI TADAHIKO
Applicant: TOSHIBA CORP
Classification:
- international: H01M8/04
- european:
Application number: JP19950207149 19950814
Priority number(s):

Abstract of **JP9055219**

PROBLEM TO BE SOLVED: To minimize the damage to a fuel cell main body and to prolong the life by deciding a limit voltage value for performing protective stop with the specified method and controlling the output based on the decided limit voltage.

SOLUTION: Detecting means for detecting the flow rates and the temperatures of a fuel 26, an oxidizing agent 28, and cooling water 29 supplied to a fuel cell main body 20, DC current outputted from the fuel cell main body 20, and DC voltage outputted from an upper unit cell, upper plural cells, a lower unit cell, or lower plural cells of the fuel cell main body are arranged. A voltage computing means 37 for computing voltage based on the detected fuel flow rate, hydrogen concentration, oxidizing agent flow rate, cooling water temperature, and DC current, and for computing a limit voltage for performing protective stop by subtracting a constant allowable voltage from the computed voltage is installed. A voltage comparing means 38 for comparing the limit voltage with cell output DC voltage detected with the detecting means and for outputting a signal, and an output control means 39 for controlling the output power of a power converting device 30 based on the output signal of the voltage comparing means 38 are arranged.



FUEL CELL POWER GENERATING DEVICE AND OPERATION METHOD

Legal status (INPADOC) of **JP9055219**

No legal data found.

JAPANESE [JP,09-055219,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

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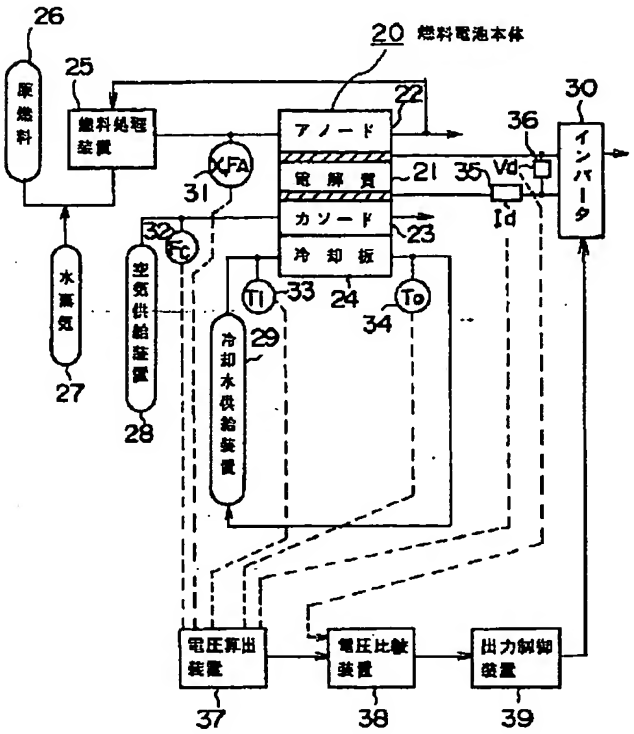
CLAIMS

[Claim(s)]
[Claim 1] While supplying the fuel which comes to carry out opposite arrangement of an anode electrode and the cathode electrode on both sides of the matrix which sank in the electrolyte, and uses hydrogen as a principal component to said anode electrode, oxidizers, such as oxygen, are supplied to said cathode electrode. The body of a fuel cell which a cooling plate is made to intervene suitably, carries out the laminating of two or more cels which obtain electric generating power by the electrochemical reaction of the fuel and an oxidizer concerned, and changes, The power converter which changes into alternating current power the direct current power outputted from this body of a fuel cell, and is outputted to an external load, The fuel processing unit which supplies a fuel to the anode electrode of said body of a fuel cell, In the fuel cell power plant which consists of an oxidizer feeder which supplies an oxidizer to the cathode electrode of said body of a fuel cell, and a cooling water feeder which supplies cooling water to the cooling plate of said body of a fuel cell The fuel flow, hydrogen concentration which are supplied to the body of a fuel cell from said fuel processing unit, The oxidizer flow rate supplied to the body of a fuel cell from said oxidizer feeder, body inlet temperature of a fuel cell and outlet temperature of cooling water which are supplied to the body of a fuel cell from said cooling water feeder, Each detection means to detect the direct current voltage outputted from the up single cel or up two or more cels and lower single cel, or lower two or more cels of the direct current outputted from said body of a fuel cell, and said body of a fuel cell, respectively, The fuel flow detected by said each detection means, respectively, hydrogen concentration, an oxidizer flow rate, An electrical-potential-difference calculation means to compute a circulating water temperature and the discharge voltage value to which a protection halt which calculated the electrical potential difference and lengthened a part for a fixed allowable voltage from the calculated electrical potential difference concerned based on a direct current is applied, An electrical-potential-difference comparison means to compare the discharge voltage value computed by said electrical-potential-difference calculation means with the output direct current voltage of the body of a fuel cell detected by said detection means, and to output a signal, The fuel cell power plant characterized by having an output-control means to control the output power of said power converter, and changing based on the output signal from said electrical-potential-difference comparison means.
[Claim 2] While supplying the fuel which comes to carry out opposite arrangement of an anode electrode and the cathode electrode on both sides of the matrix which sank in the electrolyte, and uses hydrogen as a principal component to said anode electrode, oxidizers, such as oxygen, are supplied to said cathode electrode. The body of a fuel cell which a cooling plate is made to intervene suitably, carries out the laminating of two or more cels which obtain electric generating power by the electrochemical reaction of the fuel and an oxidizer concerned, and changes, The power converter which changes into alternating current power the direct current power outputted from this body of a fuel cell, and is outputted to an external load, The fuel processing unit which supplies a fuel to the anode electrode of said body of a fuel cell, With the fuel cell power plant which consists of an oxidizer feeder which supplies an oxidizer to the cathode electrode of said body of a fuel cell, and a cooling water feeder which supplies cooling water to the cooling plate of said body of a fuel cell When the direct current voltage outputted from the up single cel or up two or more cels and lower single cel, or lower two or more cels of said body of a fuel cell is compared with the discharge voltage value to which a protection halt is applied and the direct current voltage concerned exceeds a

discharge voltage value The fuel flow supplied to the body of a fuel cell from said fuel processing unit in the operating method which performs a protection halt of said fuel cell power plant, Hydrogen concentration, the oxidizer flow rate supplied to the body of a fuel cell from said oxidizer feeder, Body inlet temperature of a fuel cell and outlet temperature of cooling water which are supplied to the body of a fuel cell from said cooling water feeder, The operating method of the fuel cell power plant characterized by supervising the direct current outputted from said body of a fuel cell, and making into said discharge voltage value said fuel flow, hydrogen concentration, an oxidizer flow rate, a circulating water temperature, and the value that lengthened a part for a fixed allowable voltage from the electrical potential difference computed based on a direct current.

[Claim 3] While supplying the fuel which comes to carry out opposite arrangement of an anode electrode and the cathode electrode on both sides of the matrix which sank in the electrolyte, and uses hydrogen as a principal component to said anode electrode, oxidizers, such as oxygen, are supplied to said cathode electrode. The body of a fuel cell which a cooling plate is made to intervene suitably, carries out the laminating of two or more cels which obtain electric generating power by the electrochemical reaction of the fuel and an oxidizer concerned, and changes, The power converter which changes into alternating current power the direct current power outputted from this body of a fuel cell, and is outputted to an external load, The fuel processing unit which supplies a fuel to the anode electrode of said body of a fuel cell, In the operating method in the load process of the fuel cell power plant which consists of an oxidizer feeder which supplies an oxidizer to the cathode electrode of said body of a fuel cell, and a cooling water feeder which supplies cooling water to the cooling plate of said body of a fuel cell The fuel flow, hydrogen concentration which are supplied to the body of a fuel cell from said fuel processing unit,

Drawing selection Representative drawing



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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the fuel cell power plant of for example, a phosphoric-acid mold, and its operating method, especially, controls damage of the body of a fuel cell in various service conditions to the minimum, and relates to the fuel cell power plant which attained reinforcement of the body of a fuel cell, and its operating method.
[0002]
[Description of the Prior Art] Recently, the fuel cell which obtains electric generating power using the electrochemical reaction of a fuel and an oxidizer has attracted attention widely from the reasons of the goodness of the conversion efficiency of the fuel, the safety to an environment, etc.
[0003] As such a fuel cell, although various kinds of things are known according to the electrode structure, the quality of the material, etc., as for the fuel cell of the phosphoric-acid mold which used the phosphoric acid as an electrolyte also especially in it, utilization is progressing most.
[0004] Drawing 5 is the schematic diagram showing the example of a system configuration of the fuel cell power plant which used this kind of phosphoric acid fuel cell. In drawing 5 , the body 1 of a fuel cell sandwiches the matrix containing the phosphoric acid which is an electrolyte about the anode electrode 2 which contacted fuels, such as hydrogen, at the tooth back, and the cathode electrode 3 which contacted oxidizers, such as oxygen, at the tooth back, and is arranged and constituted by both sides.
[0005] Moreover, in the preceding paragraph of the anode electrode 2 of the body 1 of a fuel cell, the reforming machine 4 which is a fuel processing unit is formed, the mixed gas of the natural gas and the steam which were supplied to this reforming machine 4 serves as hydeogen-rich gas by the reforming reaction, lets the flow control valve 5 arranged on that lower stream of a river pass, and the anode electrode 2 of the body 1 of a fuel cell is supplied.
[0006] Furthermore, the compressed air supplied from the compressor which is not illustrated is supplied to the cathode electrode 3 of the body 1 of a fuel cell through a flow control valve 6. In addition, in an anode outlet condenser and 9, a reformer burner and 10 show a cathode outlet phosphoric acid absorber, and, as for 7, 11 shows [an anode outlet phosphoric acid absorber and 8] the cathode outlet condenser, respectively.
[0007] On the other hand, the direct current power outputted from the body 1 of a fuel cell is changed into alternating current power through the inverter which is the power converter which is not illustrated, and is outputted to an external load. Moreover, output voltage of the body 1 of a fuel cell and control of a current are performed by controlling a fuel, the amount of supply of air, and output power by the control signal which the power control device which received the external load-up command and the downward command emits.
[0008] In this fuel cell power plant, although the inverter which is a power converter answers at the rate of below a millisecond when there is a rise command of a load, the response of a fuel cell is controlled by the response of the compressor which is the reforming machine 4 and air supply equipment which are a fuel processing unit, and a response becomes slow.
[0009] By the way, when carrying out feedforward control of the fuel cell power plant by load-up command, a command value is set as target power, and, as for the inverter which is a power converter, the reforming machine 4 and compressor which are the feeder of reactant gas (a fuel, compressed air) also set a

command value as desired value.
[0010] However, the insufficient condition of reactant gas occurs on the body 1 of a fuel cell temporarily for the supply delay of reactant gas (a fuel, compressed air). and the vicious circle to which output voltage falls increasingly although the inverter which is a power converter increases the output current of the body 1 of a fuel cell and it is going to maintain output power to that desired value since the insufficient condition of this reactant gas causes the fall of the output voltage of the body 1 of a fuel cell consequently -- happening -- just -- being alike -- it lapses into lack of gasoline.
[0011] Moreover, in the load shift process in which a fuel cell power plant continues with the air installation from the condition of not generating electricity, and an inverter injection, when the cathode electrode 3 is permuted by the air ambient atmosphere from nitrogen-gas-atmosphere mind, a difference arises in the time amount which a permutation takes about the direction of a laminating. For this reason, the long cel of permutation time amount is gas insufficient relatively.
[0012] On the other hand, the lack of gas by presentation change of the fuel gas by the fault of the reforming machine 4 which is a fuel processing unit, and breakage of the charging line system of reactant gas etc. is one of causes of an output voltage fall of the body 1 of a fuel cell besides the above, and the situation where a generating mode becomes impossible also in this case occurs.
[0013] Then, in order to prevent generating of such a situation, when the output direct current voltage of the body 1 of a fuel cell is supervised and the value falls below to predetermined level, the approach of suspending operation of a fuel cell power plant is learned.
[0014] However, the above-mentioned predetermined level is always made into constant value, without asking a partial load and a rated load, and is made into the compressed air, the flow rate of a fuel, and the value unrelated to a utilization factor.
[0015] The electrical potential difference of partial load operation is higher than the electrical potential difference of rated operation, and for this reason, not only by rated operation but by partial load operation, when cell voltage reaches predetermined level, an air utilization rate or a fuel utilization rate will be in 90% or more of condition.
[0016] In this case, the temperature of the part which current concentration increased as the air utilization rate became large, and the current concentrated has large possibility of exceeding an allowed value. And the rise of this temperature accelerates degradation of the catalyst of the body 1 of a fuel cell and an electrode member, and the body 1 of a fuel cell serves as a short life.
[0017] Moreover, also when a fuel utilization rate increases beyond a predetermined value, on the lower stream of a river of the fuel of the body 1 of a fuel cell, it will be in a fuel insufficient condition, and corrosion reaction C+H2 O->CO+2H+2e of carbon with another normal reaction H2 ->H+e in the anode electrode 2 will occur. For this reason, degradation of an electrode member and a catalyst arises and the body 1 of a fuel cell serves as a life.
[0018]
[Problem(s) to be Solved by the Invention] As mentioned above, in the conventional fuel cell power plant, there was a problem that the life of the body of a fuel cell was short. The purpose of this invention controls damage of the body of a fuel cell in various service conditions to the minimum, and is to offer the fuel cell power plant which can attain reinforcement of the body of a fuel cell, and its operating method.
[0019]
[Means for Solving the Problem] In order to attain the above-mentioned purpose, by invention corresponding to claim 1, first While supplying the fuel which comes to carry out opposite arrangement of an anode electrode and the cathode electrode on both sides of the matrix which sank in the electrolyte, and uses hydrogen as a principal component to an anode electrode, oxidizers, such as oxygen, are supplied to a cathode electrode.

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the fuel cell power plant of for example, a phosphoric-acid mold, and its operating method, especially, controls damage of the body of a fuel cell in various service conditions to the minimum, and relates to the fuel cell power plant which attained reinforcement of the body of a fuel cell, and its operating method.

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PRIOR ART

[Description of the Prior Art] Recently, the fuel cell which obtains electric generating power using the electrochemical reaction of a fuel and an oxidizer has attracted attention widely from the reasons of the goodness of the conversion efficiency of the fuel, the safety to an environment, etc.
[0003] As such a fuel cell, although various kinds of things are known according to the electrode structure, construction material, etc., as for the fuel cell of the phosphoric-acid mold which used the phosphoric acid as an electrolyte also especially in it, utilization is progressing most.
[0004] Drawing 5 is the schematic diagram showing the example of a system configuration of the fuel cell power plant which used this kind of phosphoric acid fuel cell. In drawing 5 , the body 1 of a fuel cell sandwiches the matrix containing the phosphoric acid which is an electrolyte about the anode electrode 2 which contacted fuels, such as hydrogen, at the tooth back, and the cathode electrode 3 which contacted oxidizers, such as oxygen, at the tooth back, and is arranged and constituted by both sides.
[0005] Moreover, in the preceding paragraph of the anode electrode 2 of the body 1 of a fuel cell, the refining machine 4 which is a fuel processing unit is formed, the mixed gas of the natural gas and the steam which were supplied to this refining machine 4 serves as hydeogen-rich gas by the refining reaction, lets the flow control valve 5 arranged on that lower stream of a river pass, and the anode electrode 2 of the body 1 of a fuel cell is supplied.
[0006] Furthermore, the compressed air supplied from the compressor which is not illustrated is supplied to the cathode electrode 3 of the body 1 of a fuel cell through a flow control valve 6. In addition, in an anode outlet condenser and 9, a reformer burner and 10 show a cathode outlet phosphoric acid absorber, and, as for 7, 11 shows [an anode outlet phosphoric acid absorber and 8] the cathode outlet condenser, respectively.
[0007] On the other hand, the direct current power outputted from the body 1 of a fuel cell is changed into alternating current power through the inverter which is the power converter which is not illustrated, and is outputted to an external load. Moreover, output voltage of the body 1 of a fuel cell and control of a current are performed by controlling a fuel, the amount of supply of air, and output power by the control signal with which a carrier beam power control device emits an external load-up command and a downward command.
[0008] In this fuel cell power plant, although the inverter which is a power converter answers at the rate of below a millisecond when there is a lifting command of a load, the response of a fuel cell is controlled by the response of the compressor which is the refining machine 4 and air supply equipment which are a fuel processing unit, and a response becomes slow.
[0009]

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EFFECT OF THE INVENTION

[Effect of the Invention] As explained above, while supplying the fuel which comes to carry out opposite arrangement of an anode electrode and the cathode electrode on both sides of the matrix which sank in the electrolyte, and uses hydrogen as a principal component to an anode electrode according to invention corresponding to claim 1 The body of a fuel cell which a cooling plate is made to intervene suitably, carries out the laminating of two or more cels which supply oxidizers, such as oxygen, to a cathode electrode and obtain electric generating power by the electrochemical reaction of the fuel and an oxidizer concerned, and changes, The power converter which changes into alternating current power the direct current power outputted from this body of a fuel cell, and is outputted to an external load, The fuel processing unit which supplies a fuel to the anode electrode of the body of a fuel cell, and the oxidizer feeder which supplies an oxidizer to the cathode electrode of the body of a fuel cell, In the fuel cell power plant which consists of cooling water feeders which supply cooling water to the cooling plate of the body of a fuel cell The fuel flow supplied to the body of a fuel cell from a fuel processing unit, hydrogen concentration, the oxidizer flow rate supplied to the body of a fuel cell from an oxidizer feeder, Body inlet temperature of a fuel cell and outlet temperature of cooling water which are supplied to the body of a fuel cell from a cooling water feeder, Each detection means to detect the direct current voltage outputted from the up single cel or up two or more cels and lower single cel, or lower two or more cels of a direct current and the body of a fuel cell which are outputted from the body of a fuel cell, respectively, The fuel flow detected by each detection means, respectively, hydrogen concentration, an oxidizer flow rate, An electrical-potential-difference calculation means to compute a circulating water temperature and the discharge voltage value to which a protection halt which calculated the electrical potential difference and lengthened a part for a fixed allowable voltage from the calculated electrical potential difference concerned based on a direct current is applied, An electrical-potential-difference comparison means to compare the discharge voltage value computed by the electrical-potential-difference calculation means with the output direct current voltage of the body of a fuel cell detected by the detection means, and to output a signal, Since it had an output-control means to control the output power of a power converter, based on the output signal from an electrical-potential-difference comparison means It can cross to the large range of the output power of the body of a fuel cell, and a protection halt can be applied appropriately. A rated load operation pan is covered from bottom part load operation at a maximum load operating range, and the fuel cell power plant which lowering of the output direct current voltage of the body of a fuel cell detects the short supply of the fuel which is reactant gas, and an oxidizer, and can carry out a protection halt can be offered.

[0068] While supplying the fuel which comes to carry out opposite arrangement of an anode electrode and the cathode electrode on both sides of the matrix which sank in the electrolyte, and uses hydrogen as a principal component on the other hand according to invention corresponding to claim 2 to an anode electrode The body of a fuel cell which a cooling plate is made to intervene suitably, carries out the laminating of two or more cels which supply oxidizers, such as oxygen, to a cathode electrode and obtain electric generating power by the electrochemical reaction of the fuel and an oxidizer concerned, and changes, The power converter which changes into alternating current power the direct current power outputted from this body of a fuel cell, and is outputted to an external load, The fuel processing unit which supplies a fuel to the anode electrode of the body of a fuel cell, and the oxidizer feeder which supplies an oxidizer to the cathode electrode of the body of a fuel cell, With the fuel cell power plant which consists of

cooling water feeders which supply cooling water to the cooling plate of the body of a fuel cell When the direct current voltage outputted from the up single cel or up two or more cels and lower single cel, or lower two or more cels of the body of a fuel cell is compared with the discharge voltage value to which a protection halt is applied and the direct current voltage concerned exceeds a discharge voltage value The fuel flow supplied to the body of a fuel cell from a fuel processing unit in the operating method which performs a protection halt of a fuel cell power plant, Hydrogen concentration, the oxidizer flow rate supplied to the body of a fuel cell from an oxidizer feeder, Body inlet temperature of a fuel cell and outlet temperature of cooling water which are supplied to the body of a fuel cell from a cooling water feeder, Supervise the direct current outputted from the body of a fuel cell, and since it was made to make a fuel flow, hydrogen concentration, an oxidizer flow rate, a circulating water temperature, and the value that lengthened a part for a fixed allowable voltage from the electrical potential difference computed based on a direct current into the discharge voltage value It can cross to the large range of the output power of the body of a fuel cell, and a protection halt can be applied appropriately. A rated load operation pan is covered from bottom part load operation at a maximum load operating range, and the operating method of the fuel cell power plant which lowering of the output direct current voltage of the body of a fuel cell detects the short supply of the fuel which is reactant gas, and an oxidizer, and can carry out a protection halt can be offered.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] As mentioned above, in the conventional fuel cell power plant, there was a problem that the life of the body of a fuel cell was short. The object of this invention controls damage of the body of a fuel cell in various service conditions to the minimum, and is to offer the fuel cell power plant which can attain reinforcement of the body of a fuel cell, and its operating method.

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MEANS

[Means for Solving the Problem] In order to attain the above-mentioned object, by invention corresponding to claim 1, first While supplying the fuel which comes to carry out opposite arrangement of an anode electrode and the cathode electrode on both sides of the matrix which sank in the electrolyte, and uses hydrogen as a principal component to an anode electrode, oxidizers, such as oxygen, are supplied to a cathode electrode. The body of a fuel cell which a cooling plate is made to intervene suitably, carries out the laminating of two or more cels which obtain electric generating power by the electrochemical reaction of the fuel and an oxidizer concerned, and changes, The power converter which changes into alternating current power the direct current power outputted from this body of a fuel cell, and is outputted to an external load, The fuel processing unit which supplies a fuel to the anode electrode of the body of a fuel cell, and the oxidizer feeder which supplies an oxidizer to the cathode electrode of the body of a fuel cell, In the fuel cell power plant which consists of cooling water feeders which supply cooling water to the cooling plate of the body of a fuel cell The fuel flow supplied to the body of a fuel cell from a fuel processing unit, hydrogen concentration, the oxidizer flow rate supplied to the body of a fuel cell from an oxidizer feeder, Body inlet temperature of a fuel cell and outlet temperature of cooling water which are supplied to the body of a fuel cell from a cooling water feeder, Each detection means to detect the direct current voltage outputted from the up single cel or up two or more cels and lower single cel, or lower two or more cels of a direct current and the body of a fuel cell which are outputted from the body of a fuel cell, respectively, The fuel flow detected by each detection means, respectively, hydrogen concentration, an oxidizer flow rate, An electrical-potential-difference calculation means to compute a circulating water temperature and the discharge voltage value to which a protection halt which calculated the electrical potential difference and lengthened a part for a fixed allowable voltage from the calculated electrical potential difference concerned based on a direct current is applied, It has an electrical-potential-difference comparison means to compare the discharge voltage value computed by the electrical-potential-difference calculation means with the output direct current voltage of the body of a fuel cell detected by the detection means, and to output a signal, and an output-control means to control the output power of a power converter based on the output signal from an electrical-potential-difference comparison means, and changes.
[0020] Therefore, it sets to the fuel cell power plant of invention corresponding to claim 1. By determining the discharge voltage value to which a protection halt is applied corresponding to the fuel conditions and the oxidizer conditions of being supplied by the body of a fuel cell, circulating-water-temperature conditions, and the output direct current of the body of a fuel cell It becomes possible to cross to the large range of the output power of the body of a fuel cell, and to apply a protection halt appropriately. From bottom part load operation, a rated load operation pan is covered at a maximum load operating range, lowering of the output direct current voltage of the body of a fuel cell can detect the short supply of the fuel which is reactant gas, and an oxidizer, and a protection halt can be carried out.
[0021] In various service conditions, damage of the body of a fuel cell can be controlled by this to the minimum, and reinforcement of the body of a fuel cell can be attained. On the other hand on both sides of the matrix which sank in the electrolyte, it comes to carry out opposite arrangement of an anode electrode and the cathode electrode in invention corresponding to claim 2. While supplying the fuel which uses hydrogen as a principal component to an anode electrode, oxidizers, such as oxygen, are supplied to a cathode electrode. The body of a fuel cell which a cooling plate is made to intervene suitably, carries out the

laminating of two or more cels which obtain electric generating power by the electrochemical reaction of the fuel and an oxidizer concerned, and changes, The power converter which changes into alternating current power the direct current power outputted from this body of a fuel cell, and is outputted to an external load, The fuel processing unit which supplies a fuel to the anode electrode of the body of a fuel cell, and the oxidizer feeder which supplies an oxidizer to the cathode electrode of the body of a fuel cell, With the fuel cell power plant which consists of cooling water feeders which supply cooling water to the cooling plate of the body of a fuel cell When the direct current voltage outputted from the up single cel or up two or more cels and lower single cel, or lower two or more cels of the body of a fuel cell is compared with the discharge voltage value to which a protection halt is applied and the direct current voltage concerned exceeds a discharge voltage value The fuel flow supplied to the body of a fuel cell from a fuel processing unit in the operating method which performs a protection halt of a fuel cell power plant, Hydrogen concentration, the oxidizer flow rate supplied to the body of a fuel cell from an oxidizer feeder, Body inlet temperature of a fuel cell and outlet temperature of cooling water which are supplied to the body of a fuel cell from a cooling water feeder, The direct current outputted from the body of a fuel cell is supervised, and be made to let a fuel flow, hydrogen concentration, an oxidizer flow rate, a circulating water temperature, and the value that lengthened a part for a fixed allowable voltage from the electrical potential difference computed based on a direct current be discharge voltage values.

[0022] Therefore, it sets to the operating method of the fuel cell power plant of invention corresponding to claim 2. The output direct current voltage of the up single cel of the body of a fuel cell or up two or more cels and a lower single cel, or lower two or more cels When the discharge voltage value determined corresponding to the fuel conditions supplied to the body of a fuel cell, oxidizer conditions, circulating-water-temperature conditions, and the output direct current of the body of a fuel cell is exceeded, by performing a protection halt of a fuel cell power plant It becomes possible to cross to the large range of the output power of the body of a fuel cell, and to apply a protection halt appropriately. From bottom part load operation, a rated load operation pan is covered at a maximum load operating range, lowering of the output direct current voltage of the body of a fuel cell can detect the short supply of the fuel which is reactant gas, and an oxidizer, and a protection halt can be carried out.

[0023] In various service conditions, damage of the body of a fuel cell can be controlled by this to the minimum, and reinforcement of the body of a fuel cell can be attained. Moreover, on both sides of the matrix which sank in the electrolyte, it comes to carry out opposite arrangement of an anode electrode and the cathode electrode in invention corresponding to claim 3. While supplying the fuel which uses hydrogen as a principal component to an anode electrode, oxidizers, such as oxygen, are supplied to a cathode electrode. The body of a fuel cell which a cooling plate is made to intervene suitably, carries out the laminating of two or more cels which obtain electric generating power by the electrochemical reaction of the fuel and an oxidizer concerned, and changes, The power converter which changes into alternating current power the direct current power outputted from this body of a fuel cell, and is outputted to an external load, The fuel processing unit which supplies a fuel to the anode electrode of the body of a fuel cell, and the oxidizer feeder which supplies an oxidizer to the cathode electrode of the body of a fuel cell, In the operating method in the load process of the fuel cell power plant which consists of cooling water feeders which supply cooling water to the cooling plate of the body of a fuel cell The fuel flow supplied to the body of a fuel cell from a fuel processing unit, hydrogen concentration, the oxidizer flow rate supplied to the body of a fuel cell from an oxidizer feeder, Body inlet temperature of a fuel cell and outlet temperature of cooling water which are supplied to the body of a fuel cell from a cooling water feeder, The direct current voltage outputted from the up single cel or up two or more cels and lower single cel, or lower two or more cels of a direct current and the body of a fuel cell which are outputted from the body of a fuel cell is supervised. The output direct current voltage of the body of a fuel cell A fuel flow, hydrogen concentration, an oxidizer flow rate, When less than the discharge voltage value to which a protection halt which is a circulating water temperature and the value which lengthened a part for a fixed allowable voltage from the electrical potential difference computed based on a direct current is applied After it suspends a change of load and the output direct current voltage of the body of a fuel cell becomes larger than a discharge voltage value, he makes late the same change-of-load rate or a change-of-load rate, and is trying to continue the change of load of a fuel cell power plant.

[0024] Therefore, it sets to the operating method of the fuel cell power plant of invention corresponding to claim 3.

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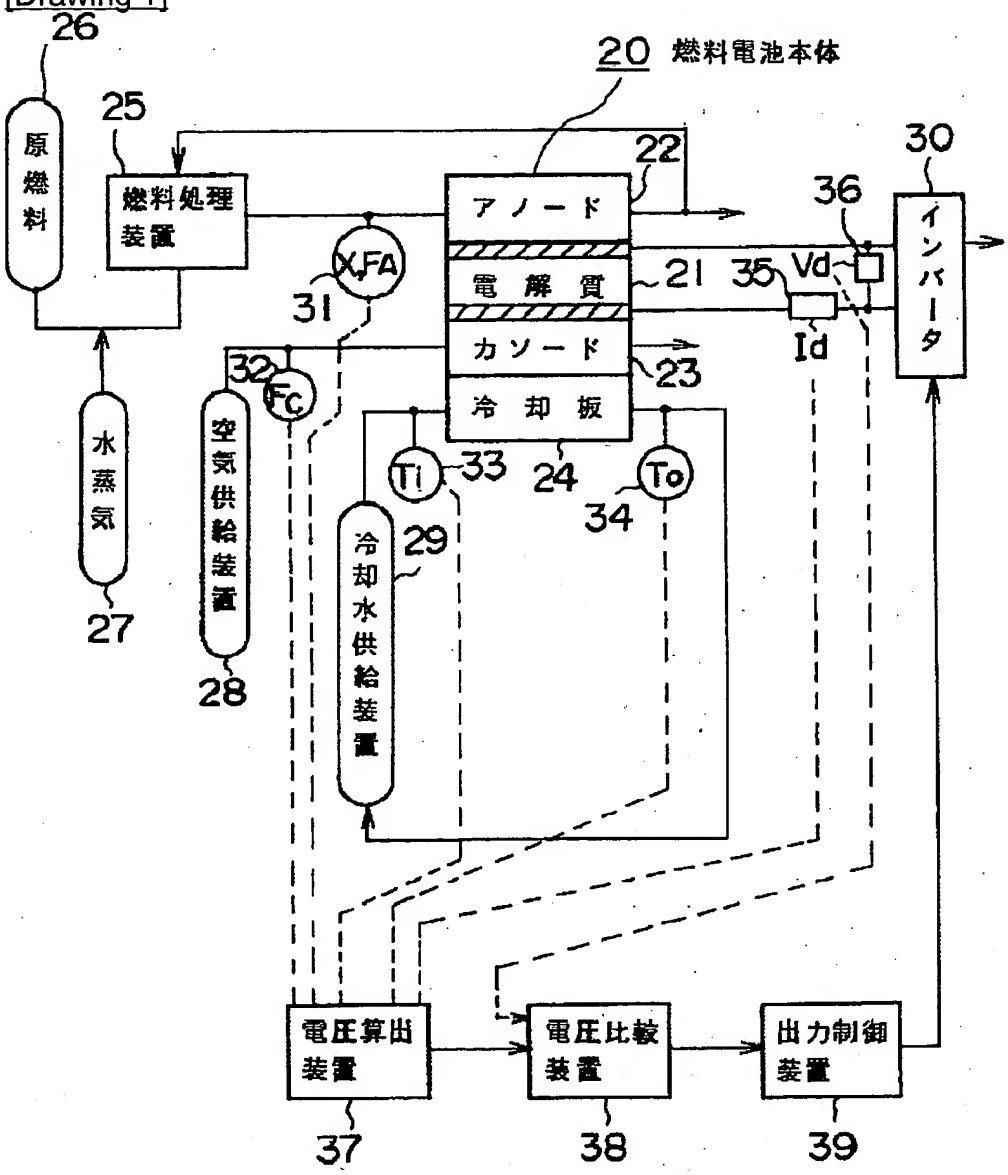
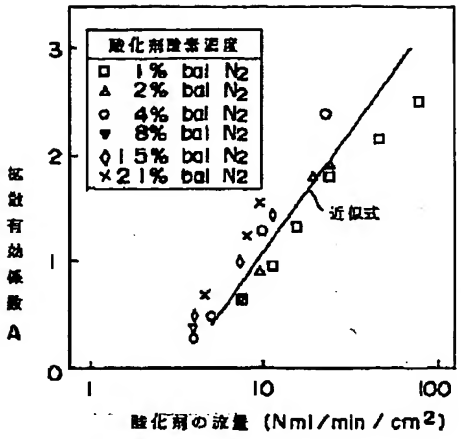
DRAWINGS

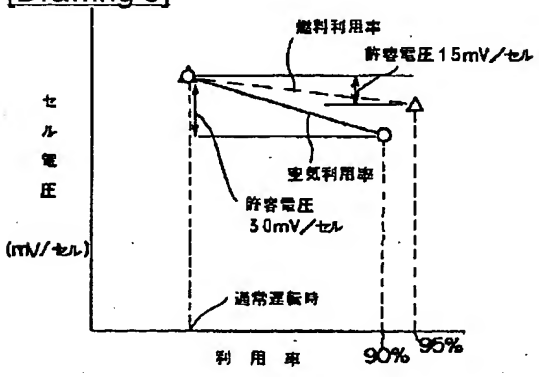
[Drawing 1]



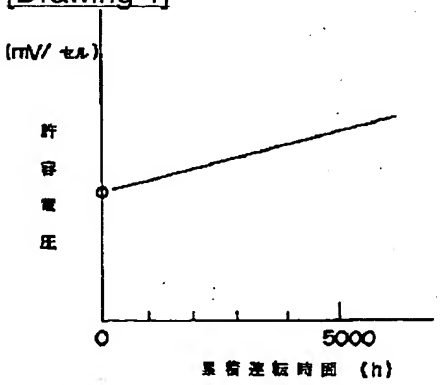
[Drawing 2]



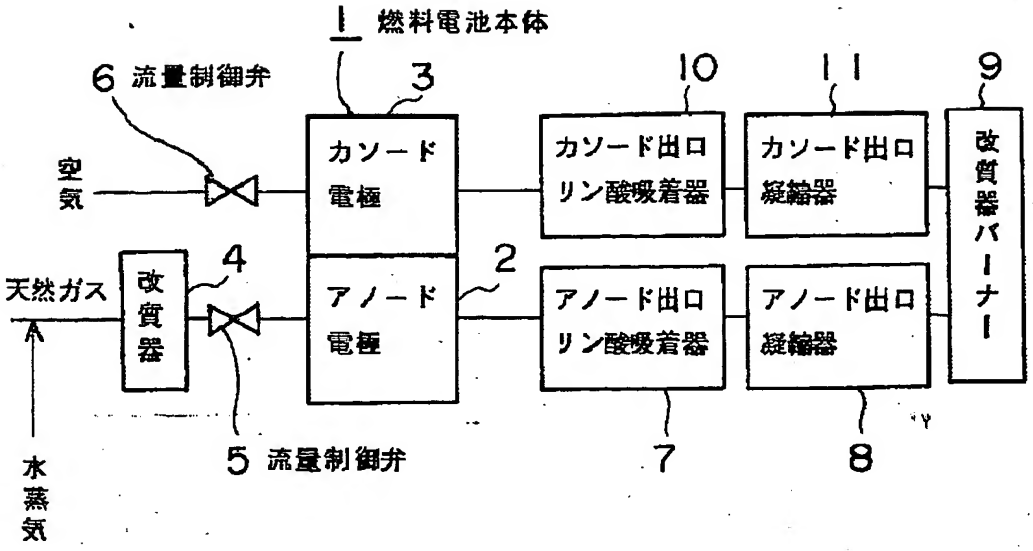
[Drawing 3]



[Drawing 4]



[Drawing 5]



[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The schematic diagram showing the fuel cell power plant by this invention, and 1 operation gestalt of the operating method.
[Drawing 2] Related drawing plotting and showing the diffusion effectiveness factor A by making an oxidizer flow rate into a variable.
[Drawing 3] The graph which shows an example of an air utilization rate property and a fuel utilization rate property.
[Drawing 4] Related drawing showing an example of a change with time with accumulation operation time and an allowable voltage.
[Drawing 5] The schematic diagram showing the example of a system configuration of the fuel cell power plant which used the conventional phosphoric acid fuel cell.
[Description of Notations]
1 -- Body of a fuel cell,
2 -- Anode electrode,
3 -- Cathode electrode,
4 -- Refining machine,
5 -- Flow control valve,
6 -- Flow control valve,
7 -- Anode outlet phosphoric acid absorber,
8 -- Anode outlet condenser,
9 -- Reformer burner
10 -- Cathode outlet phosphoric acid absorber,
11 -- Cathode outlet condenser,
20 -- Body of a fuel cell,
21 -- Matrix,
22 -- Anode electrode,
23 -- Cathode electrode,
24 -- Cooling plate,
25 -- Fuel processing unit,
26 -- Hara fuel,
27 -- Steam,
28 -- Air supply equipment,
29 -- Cooling water feeder,
30 -- Inverter,
31 -- A flow rate and concentration detector,
32 -- Flow element,
33 -- Thermometric element,
34 -- Thermometric element,
35 -- Current detector,
36 -- Electrical-potential-difference detector,

37 -- Electrical-potential-difference calculation equipment,
38 -- Electrical-potential-difference comparison equipment,
39 -- Power control device.

[Translation done.]